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CONTENTS.

SUMMARY:—
The Patent Office Fire.—The President's Committee.—Condition of Public Buildings at Washington.—The English Government and its Architects.—Architects in Public Employ.—The French Society of Masons and Stone-Cutters.—Masters and Men.—The Eleventh Annual Convention of the American Institute of Architects 317
THE VENTILATION AND WARMING OF SCHOOLHOUSES IN THE NORTHERN UNITED STATES. I. 318
THE ILLUSTRATIONS:—
Mercantile Building in Syracuse, N.Y.—Details of the Providence Railroad Station at Boston, Mass.—The School of Fine Arts, Marseilles, France 320
A FEW MORE WORDS ABOUT "QUEEN ANNE" 320
INTERIOR DECORATION OF THEATRES 322
CORRESPONDENCE:—
Letter from New York 323
THE MANCHESTER TOWN-HALL CLOCK BELLS 323
NOTES AND CLIPPINGS 323

THE injury of the Patent Office by fire has naturally aroused alarm on account of the condition of other department buildings at Washington, and the danger of great loss of the records of the government in case any of these buildings take fire. The President has appointed Col. Casey of the Engineer Corps, the Supervising Architect, Mr. Hill, and the architect of the Capitol Extension, Mr. Clark, a special committee to examine and report upon the condition of the buildings at Washington. The President's letter of instructions to the committee is as follows:

GENTLEMEN,—You are hereby appointed a commission to consider and report upon the condition of all public buildings in Washington, including those in process of construction or repair. You are instructed to proceed, without unnecessary delay, to make a personal and thorough examination of all said buildings, and to report as follows:—

First, The condition of each of said buildings as to security against fire, and whether any, and if any which of them, may be considered fire-proof.

Second, What, if any thing, can be done without further legislation to insure greater security against loss or damage by fire.

Third, What action by Congress, if any, should be recommended with a view to place the public records now in said buildings beyond danger of destruction by fire.

Fourth, To what extent said buildings, or any of them, are endangered by the character of their contents, and what can be done to remove this danger; and in this connection the Commission will consider whether danger results from the use of any portion of said buildings for branches of public service mechanical in their nature.

Fifth, What provision, if any, should be made for the custody and safety of files not in constant use.

Sixth, Such views and recommendations as may occur to you touching the general subject. (Signed)

R. B. HAYES.

BY all accounts there is room for anxiety; for in spite of the care and money that has been spent on the public buildings at Washington, there is perhaps not one, excepting the new State Department, that is completely guarded according to the standard of the present day. They are built of solid masonry, and with floors of brick, or iron and brick; but in most cases the roofs, built before all the latest precautions were adopted, have been slighted. The roofs of the newer wings of the Treasury are altogether incombustible, but that of the older part, especially of the east wing, is constructed more or less of wood, and can be burned. Those of the War and Navy Departments — old buildings, to be deserted when that which contains the new State Department and is to contain them shall be finished — are old-fashioned timber roofs as inflammable as could well be. The Post Office, built at about the same time as the extension of the Patent Office, is roofed in much the same way as that. The upper story is covered, to be sure, with a ceiling of brick arches on iron beams, and the Treasury Building is defended in the same way. But the garrets of every one of these buildings are crammed with old papers and records, the accumulation of years, for which there is no room below. It has been taken for granted that there was no danger of fire from within in these unfrequented recesses, and the danger is not great; but any construction that can burn is pretty sure to take fire in some way, sooner or later, and it would be almost impossible to save any thing from these garrets. The question will present itself, it is true, of what possible use for consultation can these neglected files be where they are; but still we do not wish them burned, nor the roofs that cover them. Fortunately the policy of the general government has not been niggardly in the construction of its buildings, and we may believe that there will be no backwardness in curing the faults that are now brought to mind, as fast as the convenience of the service allows.

WE have spoken from time to time of the singular warfare which English public men seem disposed to wage against architects. Mr. Ayrton, of happy memory, has long since disappeared from the Office of Public Works; but the opposition which was incarnate in him seems to inhere more or less in the general body of officials and legislators. We have heard Mr. Bentinck and Sir Edmund Beckett, and we have noted how Sir Gilbert Scott has just been pulled over the coals for the unsatisfactory planning of his new Foreign Offices. The *Architect* thinks that the dissatisfaction has reached a crisis, and that it would not be surprising if the government building were henceforth kept out of the hands of architects entirely. It repeats the statement made before a Parliamentary committee, which we quoted in our last number, that not one of the new buildings built in the last twenty years has been as convenient as its predecessor; and Mr. Mitford's testimony that the one new building which is satisfactory is the new Post Office in St. Martin's-le-Grand, built by the Office of Works without an architect. Mr. Mitford is further quoted as saying that if a new War Office or Admiralty were built, "it would be infinitely better built, and more satisfactory in every way, if it were built in the department, and if our own surveyors were to draw the plans." His reason for this opinion is that the surveyors are "thoroughly cognizant of all the requirements of the public departments," which of course implies the correlative that the architects are not conversant and do not make themselves so, and that this is the reason of their failure. The *Architect* adds, "It is a question whether the First Commissioner of Works in his place in Parliament may not be officially obliged to support the verdict of the working officers of his department. If he should do so, the whole weight of the government must follow."

THIS attitude of the officials is but one remove from that of Prof. Huxley in the recommendation of his honest bricklayer, and, making all allowance for the *esprit de corps* of a member of the Office of Works, is undoubtedly significant of a general feeling. The *Architect* regards it so, and is at a loss to say what is to be done if the feeling is pushed to the exclusion of architects from public work. This kind of distrust is one to which architects everywhere are more or less exposed; and besides the antagonism which may spring up between them and those who work under them, and the disposition of many people to side with these against them, there must be some reason for it. In the United States, where architects, if apparently in more esteem than in England, are much less so than in some other countries, such distrust exists, and comes to the front when accidents happen like those of the New York Post Office or the Rockford Court House, or failures in planning like that of the Capitol at Albany. It is not easy to say that if architects come to be shut out from public employment there is any thing for them to do but wait; but so long as they are given an opportunity to try again, the thing to be done is obviously to take a lesson from those who are thought to succeed better than they, and learn what is required of them. The requirements of domestic work are so generally understood, and the picturesque habit of domestic architecture lends itself so easily to them, that architects please their private clients and are consulted with confidence. But in great public buildings the requirements are intricate, and thoroughly well known only to the small class of people who use them; and the architect must go out of his way to get at them. The desire moreover, to give such buildings a dignified, formal, and what the French would call a "monumental" look, is apt to more or less con-

trol the planning and interfere with its convenience. To allow this is in the eyes of practical men the greatest offence of which an architect can be guilty. His safeguard is in the most careful consultation with those who can give him the information he needs. The trustees of the Johns Hopkins fund, to whom Prof. Huxley administered his famous advice, have improved upon it by requiring the architect of their hospital to prepare his plans in consultation with and under the supervision of a surgeon who is a recognized authority in hospital construction, the first perhaps in the country; and it was not till his plans were thoroughly digested and worked out, that they set him free to design his exterior. For a building whose requirements are so peculiar and so complicated, this was the safest thing they could do, even if they pushed it unnecessarily far. So it may be in other cases. In the long run the public will insist on having what it wants; and, as we have once said, if it does not get this from architects it will turn from them to those from whom it can get it. Fortunately for architects, they have the power in their own walk, if they will use their opportunities, to meet the wants of the public as no others can.

The French societies, both of architects and mechanics, are in many respects an example to their fellows elsewhere; not the least in that they know how to work together for the same ends. Our readers know something of the working of the *Société Centrale des Architectes*, and we have lately had occasion to refer to the Society of Masons and Stone-cutters. The French associations of master mechanics do not find themselves obliged to spend all their common energy in fighting against strikes, but make it their honorable business to encourage the proficiency and education of their workmen. The *Société Centrale*, as is known, has for some years been interested in providing means of technical instruction for workmen, a work in which its late president, M. Victor Baltard, the architect of the famous *Halles Centrales*, took especial interest. The societies of mechanics have engaged themselves in the same work. The masons' society has just established a course of free instruction, which is to include primary teaching, practical geometry, and *coupe de pierre*, by which is meant of course, not "stone-cutting" as we commonly phrase it, but the geometrical determination of the forms of stones in finished masonry, — what in the books is called stereotomy. The society also offers prizes annually in competition for the solution of problems which it proposes, to be worked out either by models or by drawings. The competitions are open to all French *appareilleurs* and *tailleurs de pierre* under forty years old. The *tailleur de pierre*, we may say, corresponds to our stone-cutter; while the *appareilleur* has not his counterpart among us. He is a workman whose duty it is to provide templates and patterns for the stone-cutting, and to lay out and sometimes plan the bonding of the stones. He must therefore be expert in the *coupe de pierre*. The good understanding that exists between the architects and mechanics is shown in the fact that the jury appointed by the society to decree its prizes is composed of architects as well as builders and mechanics.

Meanwhile England is, as the United States have been, full of conflicts between masters and workmen. The long strikes in the building trades still continue; and the importation of workmen from the United States, which there has lately been an effort to discourage, seems not to have entirely ceased. A writer in the *Building News* urges the solution of the masons' quarrel by the much-debated resource of piece-work. This seems the natural and irrefragable last resort; and if the day system is to be forever productive of quarrelling and strikes, it is difficult to see to what other resource we are to turn. It is, however, undesired both by masters and men, except in certain kinds of skilled labor: by the masters because it is complicated and laborious; by the men, we fear, because it holds them up to their work, and because it allows to the diligent and skilful their natural advantage over the incapable or idle. But no such expedient, however accepted, though it may take away many occasions for quarrelling, can remove the real difficulty, which is a want of common interests between employers and workmen. Pecuniary co-operation may do much in the various forms that have been suggested, — sharing of profits, which, however, brings as its unwelcome correlative, sharing of losses; cumulative wages, insurance and pension funds, and the like; and something of this sort seems quite desirable. But all these things leave out the best bond of union, which is common interest in the common work for the work's sake. Here it is, in trying to stimulate such an interest, that the French masters show their wisdom; and we earnestly hope that their example may spread. In our own country the Boston Chapter of the American Institute of Architects has tried to do something in this way by offering prizes to workmen; and we have heard something of movements among mechanics in favor of technical schools for their workmen. We shall be glad to hear more of them.

We have received the official programme of the Eleventh Convention of the American Institute of Architects, which, as has already been announced, will be held at Boston on the 17th, 18th, and 19th of this month. The place of meeting is the Massachusetts Institute of Technology. The morning of the first day, Wednesday, will be given to the annual address by the President, Mr. Thomas U. Walter, the reports of committees, election of officers, and other formal business; and the afternoon to visiting the new buildings in the "burnt district." The evening session will be devoted to papers and debate on Fire-proof Construction. In the morning session of the second day, papers will be read: by Mr. Robert Briggs on the Relation of Moisture in the Air to Health and Comfort, by Mr. Carl Pfeiffer on Ventilation, by Col. Geo. E. Waring, jun., on Sanitary Science. In the afternoon, the convention will visit the chief new churches and other important buildings in the Back Bay district; and in the evening session will be papers on Religious Architecture. The morning session of the third day will be occupied by a paper on Colonial Architecture by Mr. C. F. McKim, and a discussion of the subject, and the closing address by the President of the Boston Chapter. There will be a visit in the afternoon to some of the old colonial houses in Cambridge, and to Memorial Hall and other new buildings at Harvard College, the convention ending with a dinner in the evening.

THE VENTILATING AND WARMING OF SCHOOL-HOUSES IN THE NORTHERN UNITED STATES.

BY DR. F. WINSOR OF WINCHESTER, MASS.

Read at the meeting of the Social Science Association at Saratoga, Sept. 6, 1877.

The necessity for providing in some way for a sufficient supply of pure air in every room intended for use by human beings is now admitted by every intelligent person. The question is, What is a sufficient supply, and how can it be best supplied?

What tests have we of the purity of air which are at once reliable and practically available? The senses, and certain simplified processes of chemical analysis.

If we remain in a confined air which is growing vitiated by the products of respiration or combustion, we are warned of its deterioration by a growing sense of discomfort, by dull headache, desire for a long breath, inability to attend or to enjoy. But persons who are not accustomed to a good air in their rooms are not thus warned until the vitiation has become great. It is very satisfactory to notice how nearly the verdict of the healthy and well-educated senses on this question of the purity of the air in a given room corresponds to the verdict of chemical analysis. When the latter announces the proportion of carbonic acid to be above .7 to 1,000, the former say this air is too "close;" and so on through "bad," "foul," up to "unendurable," when the proportion of carbonic acid in the 1,000 reaches 1.4.

The only one of the approximate chemical tests for the purity of air which it seems to be in place to mention here is the so-called household method proposed by Dr. Angus Smith for carbonic acid; namely, "Let us keep our rooms so that the air gives no precipitate when a ten and a half ounce bottle-full is shaken with half an ounce of clear lime-water." Carbonic acid is of course taken here, as it is in treatises and papers of greater authority, as the most convenient test known to us of atmospheric purity; one sufficiently exact for most practical purposes in discussing the efficiency of ventilation. Though not in itself dangerous (except in so far as it displaces oxygen), it is so seldom found in rooms used by man, unassociated with other gases more dangerous but less easily estimated, that it is accepted as the best practical exponent of the degree to which these other more dangerous and more insidious gases prevail in the air of any room. The best known among these eminently dangerous gases are carbonic oxide, sulphuretted hydrogen, sulphide of ammonia, sulphurous acid, caprylic acid, and probably a Protean host of other volatile excretions from lungs and skin. These very rarely exist in any schoolroom

in a proportion so large as is common in the case of carbonic acid; but their presence is appreciated by the senses much more readily.

GERMS.

Of so-called "germs" we say nothing, save that, whatever they may prove to be, they must be least numerous and least dangerous in proportion as the ventilation is most complete. There are in addition to these gases the various forms of *dust*, organic and inorganic, from the wooden floors, the leathern shoes, the cotton or woollen clothing, the decomposing dirt of the streets which is brought in on shoes and clothes. In the ordinary ill-ventilated schoolroom this dust not only floats in the air when first liberated, and is stirred up afresh from the floor by every motion of the feet, but it clings to the walls, and is absorbed by the porous plaster, so that the scrapings of the walls of a typically bad schoolroom have when moistened yielded a horribly offensive mass of putrefaction.

STENCHES.

If any one clings to the old whim that nasty smells are not unwholesome, it is because he ignores a mass of evidence and of personal experience sufficient to convince all who are open to conviction. From the indefinable but unmistakable smell which so sticks to all hospitals (except the best modern pavilion or hospital tent and barrack), and which is found associated with a mortality closely corresponding to its pronouncedness, to the nauseating stench of a dysenteric stool, — bad odors are fraught with danger, and warn us against filth diseases. If we are told that imagination and fastidiousness have much to do with the suffering caused by stenches, we reply that children are certainly less observant of bad odors than adults, yet they are the earliest and most frequent victims to the filth diseases. A friend tells me that at a frequented seaside resort, a gentleman who had quite lost the sense of smell was warned away from the mouth of a drain, which opened near a seat on the rocks to which he liked to resort, by finding that his visits there were always followed by headache. Dissecting-room diarrhœa in students who have quite overcome the repugnance of beginning, and who are intent upon their work, is another instance in point; and instances might be multiplied indefinitely.

If on the other hand we are told that men employed habitually about sewers, decomposing manures, animal refuse, the holds of vessels, and so forth, are not exceptionally unhealthy, we answer that extended observation does not sustain such statements; that wounds do not heal well in such workmen; and that their apparent immunity is only temporary, and is analogous to the "tolerance" of certain other poisons, which is recognized as being set up by small and repeated doses of them, but which proves only that the system is not *shocked* by an evil to which it has become accustomed, not that it is no longer harmed by it. As well assert that a man in whom phthisis has come to a stand after having disabled one lung, and impaired the other, is as well off as a man with sound lungs, because he sustains life and performs some of its duties on an allowance of air with which the latter would find himself reduced to gasping distress and helplessness.

It is wise to suspect danger wherever there is any degree of stench, and to act upon the suspicion; although it is not always safe to feel secure where no closeness or ill odor is perceptible.

ABUNDANT PURE AIR ESSENTIAL TO HEALTH.

The history of military hospitals, which has been ably and convincingly set forth in recent monographs, furnishes irresistible evidence of the necessity of pure air to good health, and proves that with abundant fresh air the sick and wounded recover in structures so rude as scarcely to be called shelters, faster by fifty per cent than in the most substantial hospitals without it; undergoing when removed from the latter to tents, even in severe winter weather, an improvement so rapid and wonderful as to be called "magical."

It has been demonstrated that nothing so hastens the recovery of wounded and sick *men* as an abundance of pure air, but the world was a century and a quarter in learning the fact. Can it be doubted that this same pure air is the best means of preserving and brightening the health of school-children? Are we to be a century and a quarter in learning the application of this lesson to them? Will the country of free public schools grudge in every town and village the necessary outlays to keep the children's bodies in good condition while their minds are in process of educating?

CUBIC SPACE. — FREQUENCY OF RENEWAL.

How frequently it is necessary to renew the air in any room inhabited for the whole or for any considerable part of the day, and how many cubic feet must be allowed per head to its occupants, are questions which have called out the most competent investigation in all civilized countries; and the results of these investigations agree tolerably well as regards the dimensions and the frequency of renewal which should be the standard for hospitals and barracks. When these questions are raised in regard to schoolrooms, there is considerable diversity of opinion. It is agreed that such rooms, being continuously occupied but a few hours out of the twenty-four, and admitting of being well aired and cleansed during many of the remaining hours, do not require such large provision of space as is necessary in hospitals, barracks, and similar buildings. And the best modern authorities (Bosc, Varunstrapp, Sanitary Committee of Philadelphia School Board, Committee of Medico-Legal Society of New York) fix the minimum between 250 and 275 cubic feet per scholar. But practice lags far behind correct theory. The English law requires the principal schoolrooms and classrooms of national schools to contain at least 80 cubic feet of internal space, and 8 square feet of area, for each child in average attendance. Kiddle and Schem's Cyclopedia of Education require at least 108 cubic feet, and 9 feet of floor space. In New York city the requirement is for 70, 80, 90, 100 cubic feet respectively in the various ranks from lowest up!

We cannot do better than to adopt Dr. Lincoln's estimate given in his paper read in this department last September, and published in the *Sanitarian* for November last; viz., 250 cubic feet per head, or (assuming the room to be 12½ feet in height) 20 square feet of floor space per head for "children in their teens." Such children need *more food* than men and women; all physiological processes go on more rapidly in them than in adults. *They should have as much room.* Primary scholars foul air more rapidly than older children in other ways than by breathing, — as must have been generally observed, — being less nice in their habits, and having less self-control; so that a supply of air graduated exactly on the proportion of carbonic acid exhaled by young children will be certain to prove insufficient, because this gas is not in their case so true an exponent of the degree to which the air has been vitiated as in the case of older children and of adults. Moreover, the fact that young children, are, from the delicacy of their organization, much more quickly and profoundly affected by foul air, must make us insist upon giving their schoolrooms a generous measure of pure air, instead of cutting them down to a mathematical minimum based upon the estimate of their excretion of carbonic acid as compared with that of adults.

HUMIDITY.

The problem of supplying fresh air is, in our climate, complicated by the necessity of heating it, and in so doing, of changing other of its properties than that of temperature. We cannot take out-of-door air at a temperature of 32° and heat it to 120° or 150° without changing it from a condition of wholesome humidity to one of unnatural dryness, as is demonstrated by the shrinking and warping of the wood-work in our houses, and by a certain sense of oppression, irritation, and harshness, which many persons are only too familiar with in the atmosphere of ordinary furnace or stove heat.

Pure outer air at 30° Fah. contains, if quite saturated, 2.21 grains of water to the cubic foot. Heat it to 60° Fah., and it falls to 34.2 per cent of saturation; to 70° Fah., and it falls to 24.6 per cent of saturation; to 80° Fah., and its percentage of saturation is but 17, which is said to be dryer than the air of the desert. Under these circumstances it of course becomes a powerful absorbent of moisture from our bodies, especially from the pulmonary mucous membrane. It is not probable that this absorption from the pulmonary mucous membrane is absolutely harmful; witness the effect on healthy lungs of outer air at 0° Fah., which must be raised *in the lungs* in four or five seconds to 90° Fah., with a corresponding increase in its capacity for absorbing moisture, all at the expense of the lungs, which yet sustain no harm (see Derby on Anthracite, p. 28). Although opinions differ widely as to the hygienic influence of a very dry air as a general condition, — i.e., *without* as well as *within* doors, — there can scarcely be a doubt that the alternation from the very dry and hot air of many rooms to the cold and comparatively very moist outer air, and *vice versa*, to which most of us are exposed many times a day in winter, is very trying, and is a frequent cause of disease. It is almost universally, i.e., popularly rather than scientifically, admitted, that heating apparatus should be supplied with means for hydrating the air they warm, and that this hydrating is seldom sufficiently provided for.

It is not so generally understood, that if we moisten the air we may reduce by several degrees the temperature without suffering discomfort. This is certainly true for temperatures between 60° and 70° Fah. Of air above 75° Fah., it may be said that it grows less endurable in proportion to the degree in which it is moistened; and the same is certainly true of temperatures below 40° Fah., *damp* cold being harder to bear and more productive of diseases than dry cold. Moreover, it is frequently forgotten in the discussion on hydrating the winter atmosphere of our dwellings, that the very arid conditions before mentioned are *never* to be found within our rooms, whatever may be the case within the hot-air chamber of an iron furnace. Without any attempt at moistening the air we heat, it does take up a very considerable amount of water after it leaves the heating apparatus. Beside the steam from kitchen and washrooms, and contributions from every article and being in the house, it must be borne in mind that an actual though insensible passage of air is constantly occurring through the materials of the walls, be these what they may, and that this air from without has the humidity of the outer air. Consider, too, the amount of water which many building materials hold in their pores (a brick can absorb one-tenth of its weight of water), and we shall cease to wonder at the fact that the relative humidity

in our dwellings is never below 40 per cent. In school and other assembly rooms it is always higher, in consequence of the watery vapor with which every human expiration is strongly charged.

Apart from the influence of moisture on our sensations, there are practical limits placed to its prevalence in our rooms by the phenomena of condensation which begin to manifest themselves on windows and on ordinary outer walls whenever the humidity within reaches the saturation point of air at the temperature of the inner surface of the glass, and we then have frosted windows, if not walls, — a difficulty which can be overcome only by double windows and outer walls of proper thickness and construction. It is of course highly desirable that every schoolroom should be thus furnished and constructed, and much fuel would thus be saved; and the sanitarian should press the importance of this matter upon the community, and especially upon all officials connected with schools. But it is certain that for years to come his representations will be heeded by but few of those who have the practical direction of schoolrooms and buildings; and until public opinion is educated to the point of action, the vast majority of schoolrooms will still have single windows and thin outer walls, and their inmates will object to their being coated with water or with frost. There are some who insist that an interior atmosphere is unwholesome unless its humidity approaches the point of saturation, and that it should be at least as high as 70 per cent of that condition. It would seem that this view ignores the well-known effect on body and mind of "dog-day" weather, i.e., of a warm air saturated with moisture; as it does, on the other hand, the effect on body and mind of climates which are permanently dry. I regret that I cannot give statistics of the observed humidity of such climates; but certain well-known facts with regard to parts of Colorado, New Mexico, and Mexico are very significant. It must be a very dry atmosphere where fresh meat can be cured by hanging it in the open air, yet these regions are notedly salubrious. The same is true of certain parts of Peru and Bolivia, which are rainless, and so dry that houses are built of rock-salt. Sprenger, in his life of Mahomet III., bears enthusiastic testimony to the healthful and invigorating quality of the climate of Arabia. A native of the Alps, and familiar with the Himalayas, he admits that the air of neither of these mountain chains was so strengthening or so vivifying as that of the Arabian Desert. He says: "Nowhere is a man happier than in the desert; the sky is always clear, the air even in hot weather is strengthening and refreshing; every breath we draw makes us thank God for life." Palgrave testifies to the same effect, though less enthusiastically. But the following passage contains the strongest statement as to the sanitary properties of dry air with which I am acquainted: "The Harmattan is a wind which blows from the north-east (the interior of the Sahara) to the west coast of Africa, between Cape Verde (15° N.) and Cape Lopez (1° S.), a line of over 2,000 miles, lasting sometimes one day, sometimes fourteen or more days. During its prevalence every thing dries up; leaves become so parched that they can be rubbed to dust between the fingers; covers of books, though shut up in trunks, warp as if they had been exposed to a fire; household furniture cracks; panels of doors split; any veneered work flies to pieces. Another and the most striking feature of the Harmattan is its salubrity. Though prejudicial to vegetable life, and occasioning disagreeable parching effects on the human species, it is highly conducive to health. Those laboring previously under fevers generally recover during its prevalence, the feeble gain strength, and malarial diseases disappear."

Again, it must not be forgotten that moisture favors decomposition, and if we make the air of an audience or school room very moist, we certainly render more dangerous, as well as more offensive, whatever filth may be there, whether it be from dirt — commonly so styled — or from the animal exhalations of the skin and lungs; in which case it would seem that a very humid air would make ventilation more necessary, rather than less, as some of the advocates of very abundant hydration contend. Another point to be borne in mind is that every room where persons are assembled is receiving from their expirations a very considerable amount of watery vapor, — from each child about 1 oz. of water per hour. This would furnish (for a school of 50 pupils) 3 *pints of water per hour*, — a rate of evaporation quite equal to that from most furnaces supplied with an evaporating pan. If it be objected that this is very impure vapor, and therefore needs to be increased by so much more pure watery vapor, the reply is that it is inevitable, and is made no better by the addition proposed. It must be got rid of by ventilation. Suppose 50 children, each giving out 500 grains of water (= 25,000) per hour, — a suitably large room will contain (250 x 50) 12,500 cubic feet, — and as the air is supposed to be changed three times in an hour, the total hourly supply of air = 37,500 cubic feet. Therefore there exists constantly in the air the amount of $\frac{2}{3}\frac{5}{7}\frac{0}{5}\frac{0}{0}\frac{0}{0}$, = $\frac{2}{3}$ of a grain per cubic foot, coming from the children's lungs. If saturated air at 70° Fah. contains 8 grains per foot, $\frac{2}{3}$ of a grain will represent 8 per cent added to the figure expressing the humidity; air at 50 per cent humidity will be raised to 58 per cent. The writer is inclined to agree with Dr. George Derby that in our winters the air of a schoolroom, which does not exceed 68° Fah., requires no artificial evaporation on the score of health. It will maintain itself above 50 per cent of saturation whatever heating apparatus is used; and in our climate, which is dry as compared with Europe, it may be questioned whether it is wise to accustom ourselves to a humidity within doors very much in excess of that which prevails without. (*Anthracite and Health*, p. 32.)

THE ILLUSTRATIONS.

MERCANTILE BUILDING, SYRACUSE, N.Y. MR. ARCHIMEDES RUSSELL, ARCHITECT.

(Syracuse, N.Y.)

THIS building now erecting in Syracuse is to be used for general business purposes; forty-five feet front on North Salina Street, and one hundred feet on Church Street. The fronts are built of Trenton front-brick, and the finish is Berlin Ohio sand stone. The estimated cost is $30,000. The owners are Hickox and Young, Hier and Aldrich.

DETAILS OF THE PROVIDENCE RAILROAD STATION, BOSTON, MASS. MESSRS. PEABODY AND STEARNS, ARCHITECTS.

(60 Devonshire Street, Boston, Mass.)

This is a drawing belonging to the series which was prepared by the Portfolio Club.

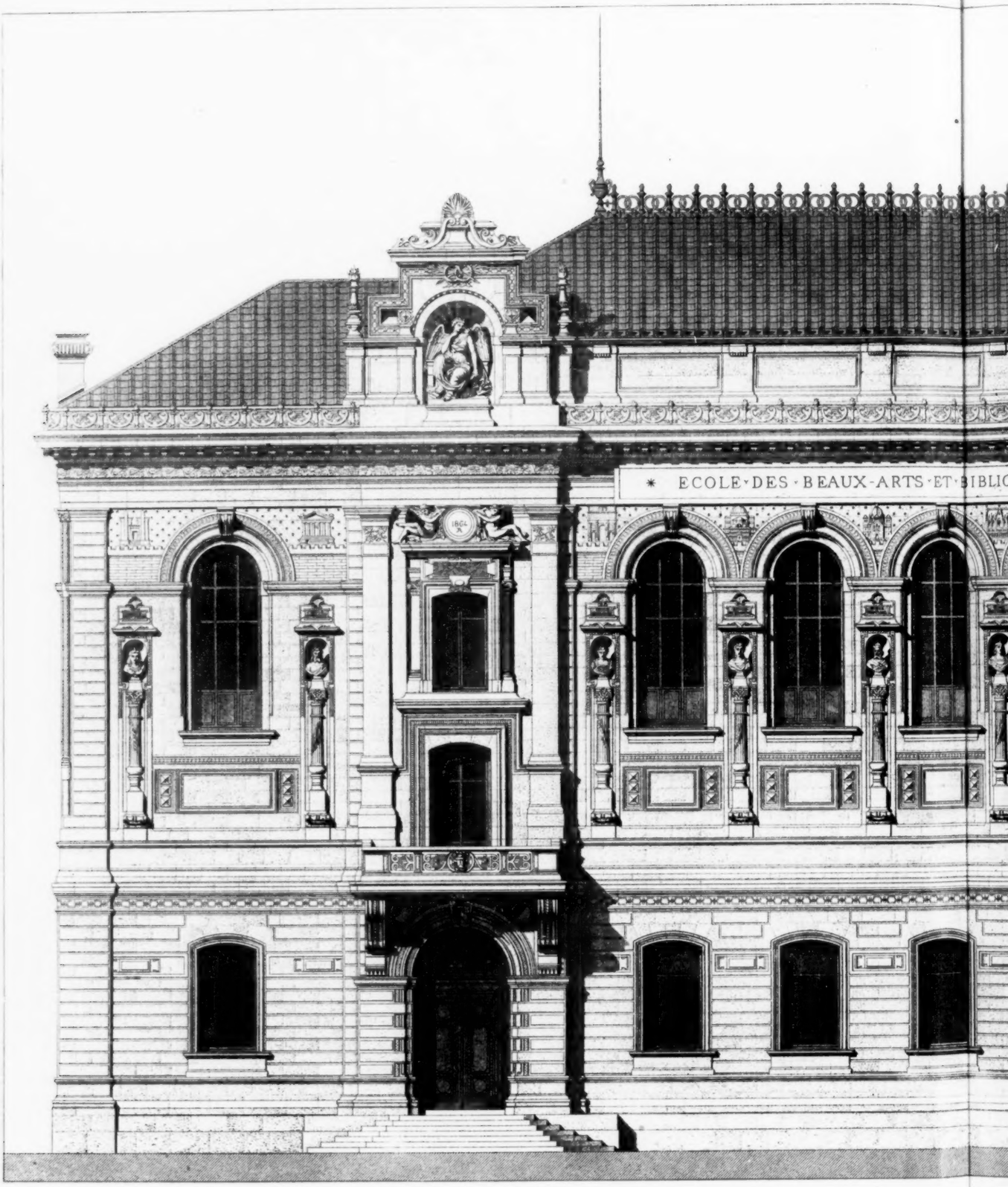
SCHOOL OF FINE ARTS AT MARSEILLES, FRANCE. M. ESPÉRANDIEU, ARCHITECT.

In pursuance of the policy which we have adopted of issuing from time to time illustrations of the most important work of foreign architects, we give with this number a view of the principal façade of the School of Fine Arts at Marseilles, designed by the late M. Espérandieu, city architect.

A FEW MORE WORDS ABOUT "QUEEN ANNE."

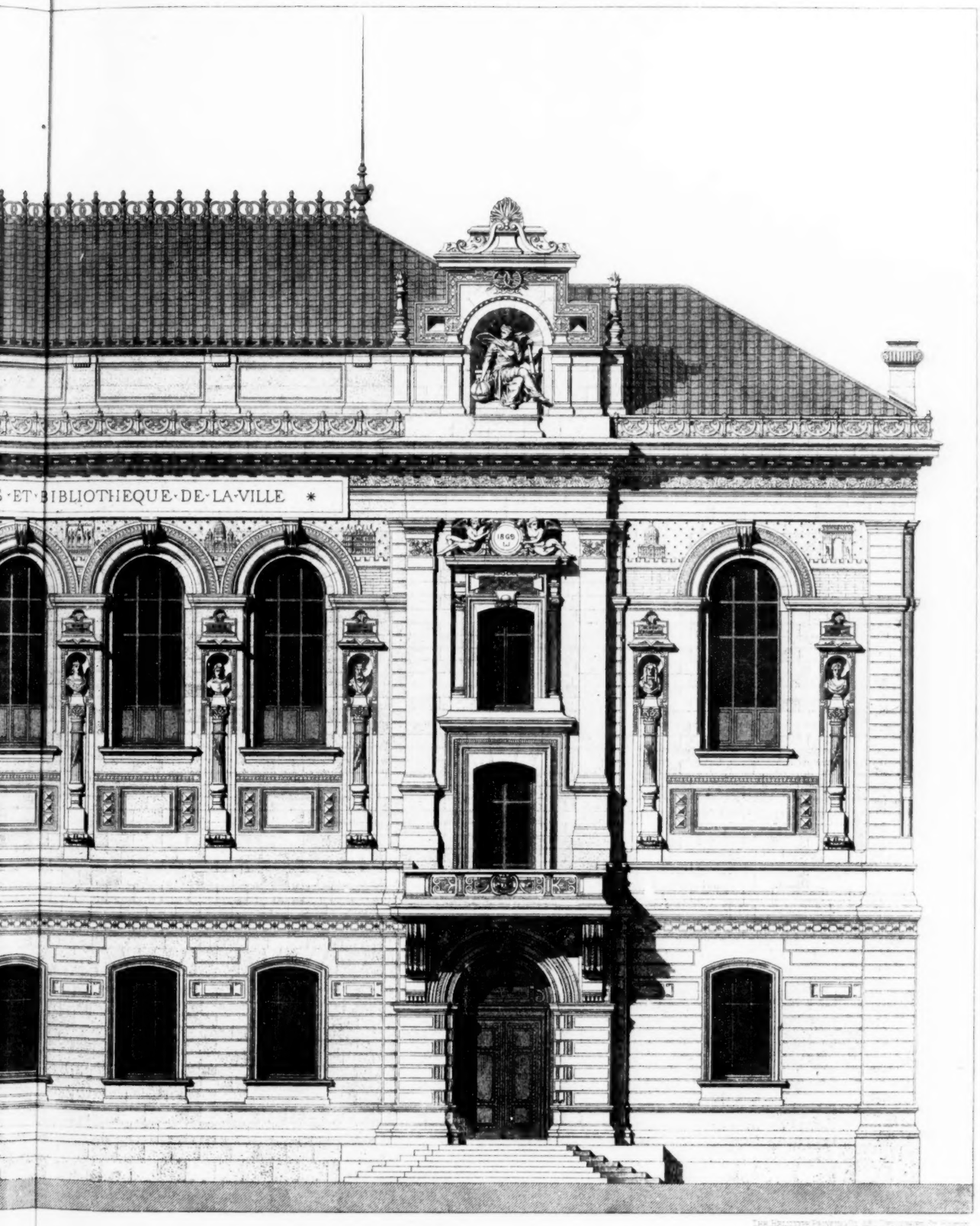
LONDON.

THE so-called revival grows apace, and, whether we like it or not, forces itself more and more on our attention. Almost every month new buildings are completed, which brilliant in red brick, tile roofs, and white sashes, claim kinship with the now fashionable style originally begun by a few very clever men. Every tyro now must needs cut his teeth or win his spurs in the wake of his betters. The leaders have a lot of imitators; and, as might be expected, the work of the latter is not marked by the refinement and study typical of the best efforts of the school. In the presence then of so much work of a kind, a few words on the rise and progress of the so-called revival may not be out of place. First, then, it may be remarked that as "Queen Anne" grew out of the Gothic revival, so the first architects who took it up were Gothicists to a man; as also the elements of the style are eminently picturesque and artistic, so its first disciples were artists in the true sense of the word; whatever they touched bore the impress of artistic power: hence it is not to be wondered at if the earlier works of the school charmed us by something more than their mere originality. We have said the style was developed from the Gothic revival: we shall see how this came about. The great difficulty with the Gothicists had always been, how to make their favorite style adapt itself to the many varied requirements of a modern dwelling-house. Originally, in the early days of the revival, every thing of a later date than the thirteenth century was pooh-poohed and frowned upon as unworthy of notice, and some enthusiasts even went so far as to declare that no architecture worthy the name had been done in England since that date. This, of course, was soon found to be nonsense, but not before we had searched Italy and France in quest of new inspirations coming within the sacred date; then men began to study and think more of the work lying under their eyes in their own land; as they did so, the special beauties of English late Gothic became every day more apparent, and what was despised before was faithfully and lovingly followed now; the process once begun, no one now cared to name a date after which nothing worthy of notice was to be found and appreciated. This was a healthier feeling at any rate, and one more creditable to our common sense and good taste; at least we had ceased to despise the men who had lived and worked before us, as had been done in the early days of the Gothic revival. If this was a boon to the church architect, it will be easily seen what a great gain it was in domestic work. Stern Goths such as Mr. Burges and others had been trying their hardest to make a Gothic castle look like a modern English house, we need not say with what result; but now the limitation once removed, what endless charms and beauties are presented to us in the old English manor and farm houses scattered over the length and breadth of the land! The wonder is, we could ever have been so blind as to overlook them; here we had a precious treasure-house of domestic work open to our hands; and the more we looked at it, the later down the stream of time we followed its course, we could not but be struck with its evident adaptability to all the requirements of English life. And withal how picturesque it is! — high-pitched roofs to weather the storm,



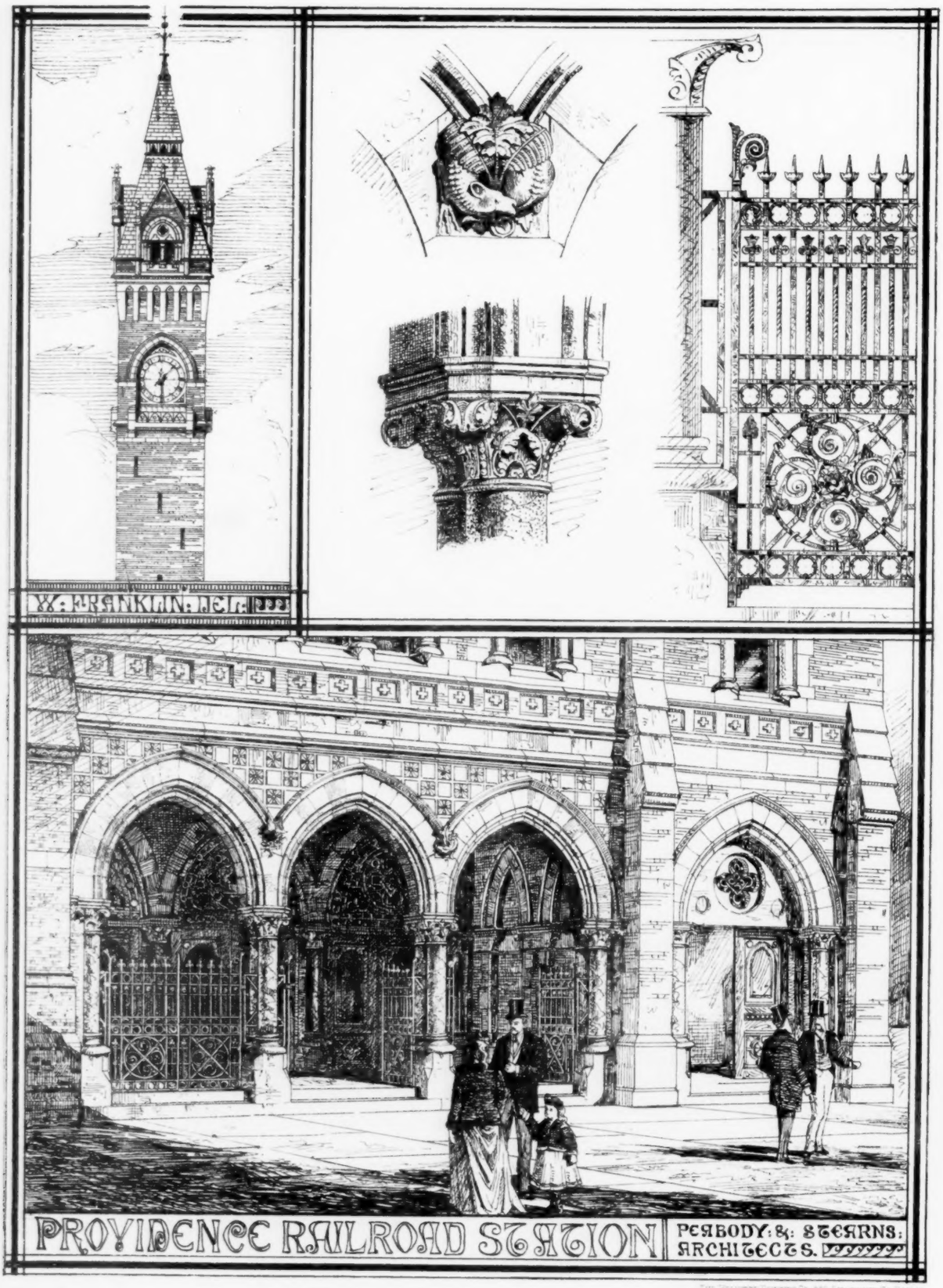
SCHOOL OF FINE-ARTS AT MA

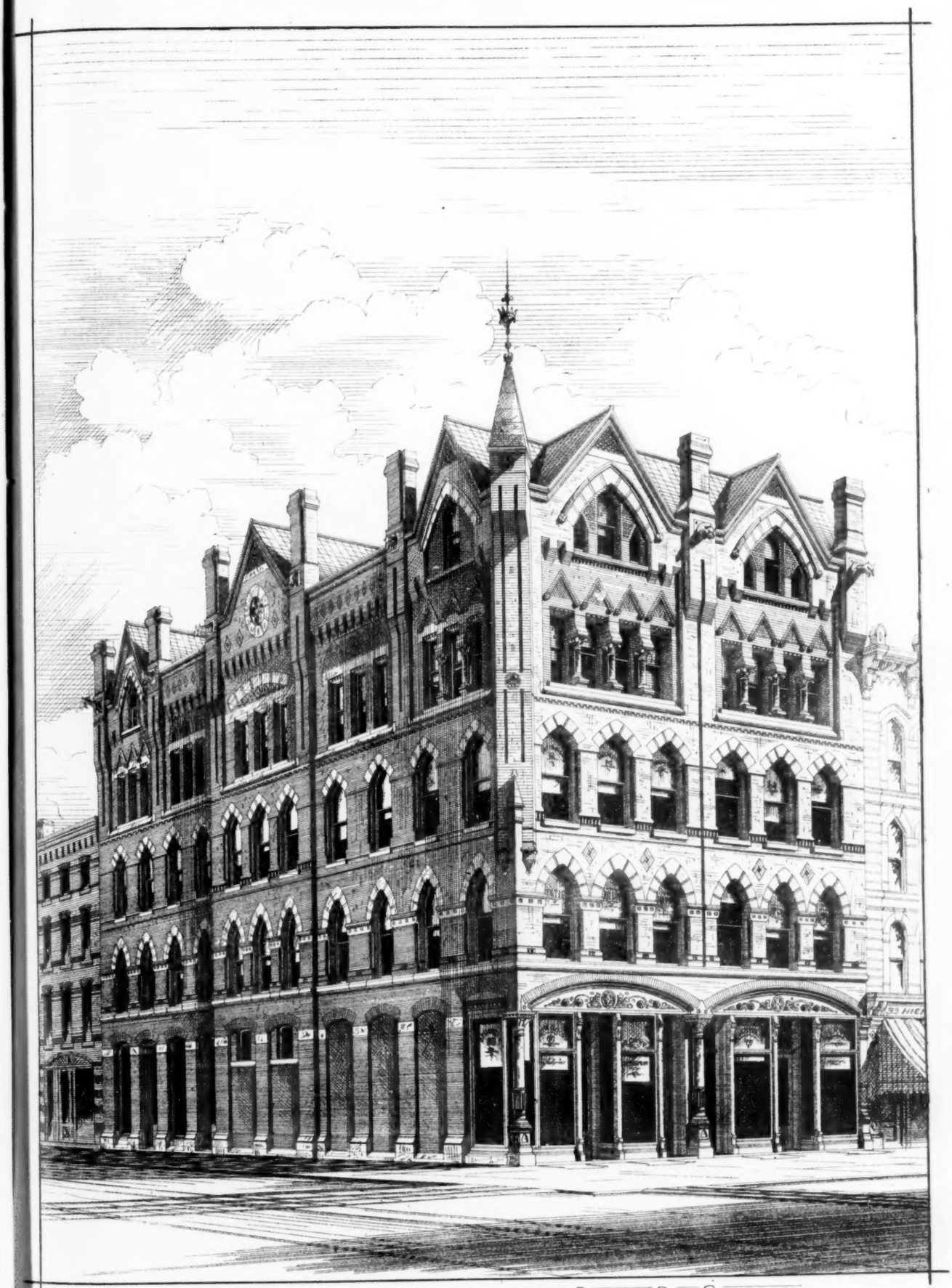
M. E. SPERANDIEU, A



AT MARSEILLES FRANCE.

ERANDIEU, ARCH'T.


PROVIDENCE RAILROAD STATION
PEABODY & STEARNS
ARCHITECTS.



BUILDING · CORNER OF NORTH SALINA AND CHURCH STS. SYRACUSE.

ARCHIMEDES RUSSELL ARCHT.

tall chimney-shafts to carry away the smoke, broad bay-windows to sun ourselves in, quaint nooks to chat in, or cosey chimney-corners to gather round in winter — there is no end of features; and all English, all our own. From the earliest times down almost to our own days, all this noble domestic work was a gradual development, a history of our domestic life in bricks and mortar, interrupted only when the rage for revivals began. First we tried Greek, and turned up our noses at every thing Gothic; then we tried Gothic, and did *ditto* by every thing classic; ignoring the fact that there were plenty of men who lived before us, who, though they did neither, knew not only how to build to suit their work to the requirements of their age, but to do so artistically, and as true architects to unite the useful with the beautiful. With the best of our Gothic men studying such a field, there could be but one result, — the narrow-minded ways of the earlier days of the revival were swept away as the beauties of the later work made themselves felt; in fact, a sort of walking-back process began which showed itself first in houses of a late English Gothic type; pointed windows gave place to the broad, many-mullioned lights and other features characteristic of the period. As was to be expected from their architects being trained in a Gothic school, the first of these houses were still essentially Gothic, though of a very late type; half-timbered work plays an important part in their design, and the mouldings and carvings bear the impress of sixteenth century-work: the earlier manor-house is still the model. But as the work progresses, still later models are followed, till we have houses after the seventeenth and eighteenth century type, or what we now call "Queen Anne." And the reason of this is not far to seek. The study of the subject proved the fallacy of all so-called revivals, and showed the gradual development of the old work to be so complete, that instead of stopping the sequence as was done when we tried to put a Greek temple in an English park, it would have been more to the purpose to take up the story and carry it on from the point it had reached, and with the material lying ready to our hands. This is what the so-called revival of Queen Anne really is; an attempt to continue the work of English domestic architecture in the true spirit of English work, and with the materials most readily to be had in any locality where it may be wanted. Why it has been called "Queen Anne" is more than any one can tell: the name has about as much to do with the style as our old Gothic had to do with the Goths, and that is simply nothing; but there, it has received its name, and as one is about as good as another, "and probably better" as Lord Dundreary used to say, we presume it will now remain.

But in thus taking up the thread of English domestic architecture where it was broken, it is as impossible for us to ignore all that has been done during the Gothic revival, as it was for the Gothicists to ignore every thing later than the thirteenth century. We cannot blot out any page of the history if we would, and it would not be good for us if we could. We have learned a great deal, as we have unlearned much, during the past forty years. We have the whole heritage of the past for reference if we would be wise to know good things. Hence we do not seek to revive, — there is no such thing as revival in the case, — but to go on with the greater knowledge acquired since the history was broken in the end of the eighteenth century. That this phase of English work adapts itself better than any other to our modern wants, simply means that it comes nearer than any other to our immediate time, and that the requirements of our houses in their main outlines have not changed so very much during the present century. Our principal building material is brick: it seems made for the use of brick. The ordinary sash window is, after all, the most convenient for most purposes: quite a feature is to be made of this simple requirement. We want good joinery and good plaster-work inside, as we want good brick-work outside: again we find ourselves at home with it in this — high pitched roofs to brave the rain and snow of our northern climes, and tall chimneys to carry off our city smoke: we have as many of those as desired. The development, even so far as it has begun again, has been a gradual and vigorous one. It is a long stride from the Leys Wood to the New Zealand Chambers of Mr. Shaw, or from the Combe Abbey or Cloverley Hall, to Kinmel House of Mr. Nesfield; but it is a perfectly natural one, though it does not by any means follow that, having done a Renaissance house like Kinmel, which is almost as advanced classic as Wren's work at Hampton Court Palace, we are never to do a late Gothic house like Leys Wood.

A recent writer on the subject of Queen Anne in the *American Architect*, who signs himself "S.," falls into the very common error of supposing that works like "Leys Wood" or "Cloverley Hall" come under the cognomen of Queen Anne at all. He says, "Except the great and novel invention of the lintel, it would be hard to say what there is of Queen Anne" about such works as "Cragside" and "The Wispers" by Mr. Shaw. The answer is, there is simply nothing of the style in either, and nobody ever said there was; not even "the great and novel invention of the lintel!" The lintel came to be used in late work and later times, simply because it has been found much more convenient than the arch for the doors and windows of our house: that is all; and the lintel in itself is no more Queen Anne than it is any thing else. Here again we may note the absurdity of the name given to all this late work, seeing that of the types on which it is founded quite as many existed before as after the reign of the now famous Queen Anne. Thus we have shown how this great re-action in favor of old English work was developed out of the Gothic revival, — it was almost the natural result of it, — and in some fifteen years it has grown into what we now call the Queen Anne style. We see its first beginnings in the earlier works of Mr. Philip Webb, Mr. Nesfield, Mr. Shaw, Mr. Davey, and others: we see the result in the swollen ranks of its practitioners and the increasing number of their works.

Contemporaneously with the forward movement in architecture proper, has also taken place that wonderful re-action in favor of household taste in such matters as furniture, interior decoration, stained glass, metal-work, etc., than which nothing more striking has been seen in the art-world of England during the last half century. Since Pugin wrote his wonderful "Contrasts," showing what modern upholstery was and what it might be, the movement has grown with the architectural development, in some respects even faster than it, until now it is a distinct school with settled principles, and a definite purpose in view. To no one in this department can greater honor belong than to the great art firm of Morris & Co.: they gave it form and substance; they promoted the study of old examples and the designing of new; their wall-papers alone mark an era in decorative art, while their furniture and glass and tiles have really been at the foundation of most that has come since. With artists of such power of color and design, it is little wonder the influence they exerted was immense: it affected every thing; carpets, curtains, china, stuffs of all kinds, were freed from the absurdities and mediævalisms which had too long disfigured our rooms; and our houses began to wear a healthy air of homely comfort and good taste more in harmony with the improvement in their architecture, showing what a strong hold the new school of thought has taken on the principles of design in all around us. Now there is no mistaking the vitality of the work being done: it may not at all times be in the very best of taste, the best that can be got; but at any rate it is vigorous, and is constantly making progress, rather too much indeed to be always good. And it must go on: there is no stopping the movement now, wherever it may yet lead us. Some classicists say it will end in all becoming classic; some Goths, that it will break down altogether and come to nothing. It does not seem to us that we need concern ourselves as to what the end may be; what we have to do is to do our work honestly and well, and leave the future to those who come after us. As well might an old thirteenth-century man have bothered himself about what his Gothic would become in the fourteenth or fifteenth century; what the better would his architecture have been if he had? The writer above referred to as "S.," who wrote a very smart article condemnatory of "Queen Anne" some time ago in the *American Architect*, taunts the style with want of principle, and indeed denied it the elements of a style at all. "If," says he, "Queen Anne consists in the application of classic detail to buildings designed on Gothic principles," or rather as he adds, "on architectural principles, it is entitled to be considered a style, if and in so far as the detail is consistent with and expressive of the construction to which it is applied." Now this is just what it does do: its detail is consistent with and expressive of its construction; that is to say, its elevations are expressive of the plan and purpose of the building within. In this it bears the impress of its Gothic descent. It is very easy to ridicule any building in the manner "S." does "Lowther Lodge;" but we submit that an impartial examination of the works of the school will be found to bear out what we have said. No one contends for the invention of a new style: we have yet to learn that a new style was ever "invented" by any man or set of men. "S." seems to think it a hard matter to fit classic detail to a building "designed from the ground plan" so as to make it into an artistic whole, unless its requirements are exceedingly simple: of course it is, unless the designer be an artist, and then there is no difficulty about the matter, whether the requirements are simple or complex; and we shall never have any architecture at all, Queen Anne or otherwise, worthy the name, unless we have artists to design it. With them there is no "impossibility" at all "of combining classic detail architecturally with free planning and free designs;" indeed, the very essence of the style is its freedom from the trammels of classic architecture properly so called. And then "S." quotes the building of the English Commissioners at Philadelphia as an example of modern "Queen Anne," particularizing the square timber framing as a special Queen Anne feature; when the fact of the matter is, the said building is not Queen Anne at all, but an example of old English sixteenth-century work, of which the timber framing was one of the special features. Whether it has been carried out well or ill is another matter: it is not Queen Anne. This is only an example of the loose way it has come to be the fashion to write on the subject; and, the Philadelphia building to the contrary notwithstanding, we humbly think American architects have very much to learn in the way of building artistically from the old half-timbered English houses of the sixteenth century. "S." further declares that some one has extolled Queen Anne as "combining the honesty of the Gothic with the refinement of the Renaissance," and characterizes it as a "dark saying;" but it seems to us that to be good architecture it must be both "honest" and "refined," though we have yet to learn that either of the

styles quoted had a monopoly of these virtues, so that if we find Queen Anne in possession of them it is no more than the others have had in their turn.

The best work of the school is both *honest* and *refined;* and so far as the rest fails in these, so far does it fail in being good architecture. We know of no more refined work anywhere than the front of Mr. Shaw's house in Queen's Gate; and "Lowther Lodge," in spite of "S.'s" strictures, is at least an honest piece of building. Indeed, even among the enemies of the movement it is admitted that at least it has produced good honest building, if nothing higher in the way of architecture; and good building we certainly have got by it. Before the revival most of the new streets built in the metropolis were run up of very "shoddy" bricks, and covered with equally "shoddy" compo, which in a few years began to come to pieces, and was constantly under repair. Now the era of compo fronts is doomed, and as the bricks now form the wall facing, they must be of a better description. The bricklayer may be said to be one of the greatest gainers by the change: what with cut-brick fronts, mouldings, and carvings, his craft has almost risen to the position of a fine art; and some of the more recently built buildings can be quoted as among the finest examples of brick-work in the world. Italy and Spain had once a brick architecture of great note; England seems in a fair way of acquiring the same through the efforts of the Queen Annists. There is an honesty about this which there is no getting over, and the "refinement" of much of the work solely depends on the artists who design it. Another advantage this revived brick-work has procured for us, and that is in the important element of color. The gray lines of compo fronts are giving place to the bright warm glow of red brick, thus winning for our streets an element of the picturesque, long sadly absent from them. Any one can imagine how appropriate the warm hospitable color is among the magnificent timber and rich verdure of an English park; but few who have not realized it can know what a godsend the bright red is in breaking up the dull gray monotony of our city streets. Then as with brick-work so with wood-work: now the internal fittings of our houses are carefully designed and admirably worked out; chimney-pieces, staircases, doors, panelling, all have improved in the most striking manner, in that semi-classic mode which is found at once the most appropriate and most convenient to suit our every-day requirements. Will any one say that all this is not real solid progress? The interiors of our houses now are perfect studies compared to what they were ten or fifteen years ago.

It is all very well to laugh at bric-à-brac, at the blue-china mania, at the rage for Japanese fans, at the craze for "collecting;" but each and all of these "fads" is but an evidence of an advance in matters of art, of which they are the outcomes, — an advance which has been developed and fostered mainly through the artists of the so-called Queen Anne school. The very fact, that if a man wishes to succeed in it he must be an "artist," is in itself a great gain. The mere manufacturing architect will never be able to do "Queen Anne." There is a subtlety as well as an honesty and refinement in the style, that is not to be acquired by mere copying, however closely the original may be imitated. It contains just that mixture of the Gothic and the Renaissance springing from a knowledge of both, which none but an artist knows what to do with; and if it helps to develop a race of artist-architects, it will do more than either of the revivals before it did; for the number of men who could do really good Gothic might be counted on one's fingers; and as for those who knew any thing of Greek, they have ceased to exist. This, then, is the position of the movement at present, which it is a "sheer affectation" to say is "unworthy the attention of grown men." Every year is adding, and will add, to the number and importance of the buildings designed by it. It is thoroughly English, in that it is founded on English work, and adapts itself to our feelings and our ways of life. Therein lies at once its strength and its reward, its vitality in the present, and its hope in the future. And if for England, why not for America? Whatever goes on here is sure sooner or later to affect that "Greater Britain" of which it has of late become the fashion to speak. In an admirable paper read by Mr. Peabody before the Boston Society of Architects, he says it is "a fact, whether fortunately so or not, what goes on in England in an art, as in many other matters, is to a certain extent quickly reflected here;" and so long as the relationship between the two countries is so close, this is likely to increase rather than otherwise. And farther on in the same article, Mr. Peabody declares that "there is no revival so little of an affectation on our soil, as that of the beautiful work of the colonial days," giving as an instance the old homesteads still to be found by the wayside from Hingham to Plymouth. It seems to us he strikes the key-note of the question for America in this. You, like us, have a heritage of the key-work on which it is all founded; and if ever America is to become possessed of an historical style, it must spring from the work of the old colonists. You have good brick, you have splendid timber, you have the practice of timber-constructed houses; only waiting the artist's hand to carve out a style of your own. Preserve then your old colonial architecture, and it may yet bring forth fruit of which all the world of art may be proud.

J. M. B.

The Tomb of Cecilia Metella. — The tomb of Cecilia Metella, near Rome, is to be the site for a fort.

INTERIOR DECORATION OF THEATRES.

Mr. Percy Fitzgerald, F.S.A., in an article in the *Art Journal* on "Theatres, their Construction and Arrangements," says of the decoration of the auditorium, —

"An interesting inquiry is, what is to be the prevailing tone of the hall, that is to say, the background, or lining, against which the figures are set off? The outside panelling of the balcony, etc., does not fall to this category. The prevailing white and gold of theatres like Covent Garden certainly aids in imparting that air of carpentry, as it suggests wood painted white and touched with gold. Where there are balustrades rather than balconies, the treatment should be as of metal or stone, the whole being profusely gilt. Nothing, as it has been long since established, can be meaner than our house-painters' and decorators' conventional manner of 'picking out' mouldings neatly with a little gold. Indeed, that a *salle* should be painted merely to convey the effect of painting, seems scarcely to be accepted as a principle. The effect should be produced rather by details, though of course there must be a basis of color of some kind. M. Garnier recalls the superb effect of the rich and profuse gilding of the old Opera House; and what made particular impression on him was the great thick cornice that ran round the *plafond* aloft, and which framed the simple and mysterious blue welkin, wherein floated the figures of a mysterious apotheosis. This gold seemed like jeweller's old gold: it was yellow and dim, like the dome of the Pantheon; and this hue seemed so subdued and harmonious, that M. Garnier seriously proposed having the gilding of his new theatre toned down by some artificial process. Gilding in such broad masses, and thus properly subdued, is suggestive of solid construction. With this gold was joined a rich mellow crimson, with the finest effect. In the new Paris house this effect of dimmed gold was artfully conveyed by painting the parts a rich yellow, and gilding the points on which the lights struck.

"Crimson appears to be the favorite color for all theatres, and it is arrived at by a sort of process of exhaustion. Violet lights up badly, as indeed any one may notice at the Olympic and Court Theatres, where it is in favor. Green and blue have a certain feebleness, and with yellow reflect unfavorable tones on the face. Orange, according to Eugene Delacroix, a competent judge of color, would be the most effective for a theatre, and for setting off faces and figures. As M. Garnier admits, it is 'a sumptuous and powerful' tone, and would steep the *salle* in the richest tones — so rich, indeed, as to borrow all the glories of the stage. This is, indeed, the serious objection. But it is surprising that our own theatre-decorators, who are reckless of such accidents, and only think of the indiscriminate raptures of the critics of an opening night, should have used it plentifully. Crimson, however, remains, and it is curious to find that it obtains in the following important theatres: Antwerp, Berlin, Bordeaux, Cairo, Constantinople, Copenhagen, Dublin, Frankfort, Genoa, Geneva, Hamburg, Hanover, Naples, London, Messina, Moscow, Munich, Paris (Opera), Philadelphia, Stockholm, and Vienna. That of the Fenice at Venice is all pure white Persian, and gold; that of Turin, black and crimson; of Santiago, crimson with golden *fleur-de-lys*, a truly barbaric magnificence; Prague, pure white; and the Grand Theatre of Moscow, bright amber; that of Mayence, yellow and gold, bordered with crimson velvet. Another rich combination is that of the Pergola at Florence, gray and gold, a mixture somewhat *bizarre;* and finally that of Amsterdam, a rich brown and gold. The current temper of taste sets in favour of crimson or red; and this color, it was determined, should be the ground of the new house. 'If we could guarantee,' M. Garnier says, 'the glow of health to every face in the *salle*, to every cheek a rose tint, the combination, under a brilliant light, would of itself form a fine and appropriate mass of color.' The tone that would nearest approach this effect would be accepted as the most satisfactory; and it might, at least, have the result of reflecting such a pleasing glow on the pale faces of the votaries of fashion. This may seem a little petty, but it is no doubt an element to be considered.

"The sort of *bijou* style of decorations that is now in vogue in London theatres is of the gaudiest. Strange mixtures of green and mauve, flaunting colors, even silver and violet: it is all fantastic, in bad taste, and destructive of scenic effect. The audience, whose eyes have been dazzled between the acts with this heterogeneous mixture, when the act drop rises, will find the scenes poor and faded by comparison. Neither is this excessive brilliancy of color acceptable to the audience, to whom it is trying: neither is it profitable, as these striped satin stuffs fade, while the daring colors, 'aniline' mostly, soon 'fly,' and have to be renewed. Far more in keeping is the other extreme, the treatment of the average German theatre, where a bald and almost shabby air seems to be cultivated.

"The proscenium entrance into the land of poetry and enchantment is a matter that, like every thing connected with a theatre, must be directed by a principle. The system now fashionable of giving it the shape of a frame, often gilded like the frame of a picture, however rich, seems incongruous, as such a surrounding of moving figures is not what is sought to be presented. Neither is the meagre opening cut in the wall — a smooth, level edge, with pillars or cornice — at all in keeping. Such, painted over with arabesques and figures, seems too trivial, and appears to be the opening of a caravan rather than of a building.

"We must ask ourselves the question, to what part of the building does the arch of the stage belong? It may be taken to be pierced in the fourth side of the *salle*, while it must be strong enough to serve as a support; and the style must therefore be of a solid and massive character. The stage proper is merely a platform placed close to this aperture.

"In all our new theatres, however, it is thus treated as part of the *salle*, and is decorated in harmony with it. According to this principle it, the richly-gilded frame, becomes a sort of curtained window or doorway of our own home through which we look at the sports going on outside. Another theory assumes that the proscenium is merely the front of a different building, the interior of which is seen through an arch; and this view is certainly supported by the system of construction of the new Paris and other houses, where the building containing the stage actually towers above the *salle*, as can be seen from the outside. But we have already shown that this accentuating the regions over the stage is undue and false art. It is, however, very difficult to decide this nice point, especially as the great arching, treated largely and handsomely, seems to be the entrance to a new building and not a doorway or aperture through which we are to look at something beyond. This was a conspicuous feature in the old houses. Those grand archings were the worthy vestibules of the fairy realms beyond. They were bold and even magnificent in their proportions. In some instances, as in the old French Opera House and the Bordeaux Theatre, they took the shape not of a mere profile of an arch, but of a broad archway supported on coupled columns, with the curtain draped in festoons inside. This is a contrast, indeed, to the thin 'cardboardy' partition which answers to the formation in the new theatres. In the other instances we are on the threshold of the realms of enchantment, to which this archway is the entrance."

CORRESPONDENCE.

GRACE CHURCH.

NEW YORK.

DULL as matters are at present, many of the architects here are looking forward to active work during the coming winter, and hope to be able to offer work for contract early next spring. It is true that similar expectations were indulged in a year ago, but the realization did not follow; and a summer of ordinary work, and not much of that, has been passed through. Even with offers of labor and material at extraordinarily low prices, clients have sought in addition a cheaper class of work, and with alterations and additions have sought to make present structures answer growing needs; and, where a far-sighted policy would have counselled new work and general changes, the fashion of economy has led the owners into a waiting policy, until when the rush of building does come it promises to be a lively one.

W. T. Beers & Son, architects, have just finished the design for Grace Episcopal Church of Harlem, to stand on One Hundred and Sixteenth Street, near Third Avenue. On a lot 80 x 110 feet they erect a chapel 45 feet frontage, and with the transepts at the rear 64 feet wide and 100 feet deep. Upon either flank of this, filling up the street-front, are two ordinary brown stone dwellings 20 x 45 feet each. The church, or more properly from its size a chapel, will be of the Norwood stone from Closter, N.J., along the ridge of the Palisades. This will be in coursed rock-face work, while the finish is to be in Connecticut brown stone tooled work. At either corner of the face there will be towers, one about 60 feet high, the other rising 87 feet, as a belfry; abroad line of steps will lead to a stone porch, projecting five feet from the face of the building. Above this will be a great window, the pediment overhead running up to 60 feet. On either side of the several porch doors, will stand polished blue granite columns with white marble caps and bases. The church will be lighted by clere-story windows, the roof carried on an open timber framing, springing from the side walls without aisle columns. The sanctuary will extend back under a lower arch 13 feet to an elaborate wooden screen. The pews will be in oak in common with all the interior wood-work. Other than an organ loft across the front end of the church, there will be no galleries. A basement 12 feet in the clear will be used as a schoolroom. The cost will not overrun $50,000. The Church of the Holy Saviour on Twenty-fifth Street, and the Calvary Chapel on Twenty-third Street, are from designs by Mr. Beers. He has also now in hand a residence for Mr. Wesley at Portchester, N.Y. It is a stiff design with two-story mansard roof, with no attempt at the picturesque. In plan it measures 60 x 80 feet, and will cost more than $45,000.

THE MANCHESTER TOWN-HALL CLOCK BELLS.

EIGHTEEN of the twenty-one bells of the great clock and carillon machine for the new Town-Hall are now in the tower "stocked," and ready to be put on their centres, and the other three are swung in their positions. The clock and carillons, which are combined, will when erected be the largest work of the kind in Europe. The clock is being constructed to strike the hours upon the great bell of seven tons, and to chime the four quarters on ten bells, the time to be shown upon the four illuminated dials of 16′ in diameter. The frame is on the horizontal plan, of solid cast iron, 11′ long, 4′ 6″ wide, and 4′ 2″ high. All the wheels are of gun metal, engine turned, cut, and polished. The main wheels of the striking and quarters are 2′ 6″ diameter, and the main wheel of the going part 2′ in diameter, and all the rest of the wheels in due proportion. There are two engraved and silvered dials on the clock, showing minutes and seconds, for the purpose of regulating and adjusting the outer hands, and for taking observations. The striking cams and levers are all hand steel-faced. The barrels are made of cast iron turned and grooved. The escapement is the "double three-legged gravity," which is found to be infinitely superior to all other kinds for perfect time-keeping. The pendulum is a compensated one, made of zinc and iron tubes, to beat each two seconds of time, with a cast-iron cylindrical bob of three cwt. to be suspended from a cast-iron bracket fixed on a stone corbel built into the wall. All the lines to carry the weight are of the best steel wire. There is an automatic gas apparatus fitted to the clock for turning the gas up and down, contrived to suit all seasons of the year, providing for long and short days, so that no attendance whatever will be required to turn the gas on and off, thus effecting a considerable saving in time and gas. Messrs. Gillett & Bland were the inventors of this apparatus, which they first applied to the Bradford Town-Hall clock. The clock is so constructed that the changes for the quarters can be altered at any time, and provision is made for connecting the clock with the electric current for registering Greenwich mean time. The hour bell G is the largest that will be struck upon by a clock in this country, excepting the one at Westminster Palace; the great bells at Oxford and York being struck by hand. The quarter bells will be much heavier than those at Westminster, and this will be the only instance in the United Kingdom where the quarter chimes will be played upon ten bells. The carillon machine is constructed on Gillett & Bland's improved patented system, of which they were the original introducers. It will play thirty-one tunes on twenty-one bells, weighing altogether about thirty-two tons, being double the weight of those at Worcester Cathedral and Bradford Town Hall, and, as there will be a much more extended scale and a larger number of semitones, a greater variety and a better selection of melodies will be played in five different keys. This has never yet been done on any thing like such a scale in this country. The vast improvements that Messrs. Gillett & Bland have made in the machinery are admitted to be incomparably superior to any thing of the kind on the Continent. A fresh tune will be played for every day in the month, the change of tune taking place at midnight by a self-acting shifting apparatus, and the order will be altered monthly. There will also be a barrel pricked with changes or peals which can be played for several hours, or all day if required. The machine will also have an ivory keyboard attached, so that any musician will be able to play with his fingers tunes upon the bells with as much ease as upon an organ. Each tune will be played two or three times day and night, at six, nine, three, and twelve o'clock; and the machine is so constructed that any particular tune pricked upon the musical barrels, can be played at any time, and it is fitted with an apparatus so that the tunes can be stopped or let off at any moment. The tunes will be let off automatically by the clock. Although the machine is constructed to play thirty-one tunes, there is no limit to the number of tunes that can be played by simply having fresh barrels with seven tunes on each, which can be had at any time; or, instead of having seven tunes on a barrel, it could be pricked with a long piece of music, so that by having fifty-two barrels it would be possible for the machine to play a fresh tune for every day in the year. Every part of the clock and carillon machine has been manufactured at Messrs. Gillett & Bland's steam clock factory, Croydon. — *British Architect.*

NOTES AND CLIPPINGS.

BOOKS RECEIVED. — "Mahan's Industrial Drawing" (illustrated), by D. H. Mahan, LL.D.; revised and enlarged by Daniel F. Thompson, B.S. John Wiley & Sons, publishers, New York. Price $3.50.

"New Constructions in Graphical Statics" (illustrated), by Henry T. Eddy, Ph.D. D. Van Nostrand, publisher, New York. Price $1.50.

VENTILATION IN NEW YORK. — In public school No. 28, in West Fortieth Street, there are two thousand children. The building is badly ventilated, has no cellar, and stands close to a crowded tenement-house. The rooms are only kept habitable by sprinkling the floor with disinfectants. One teacher has died already of typhoid fever, and another lies very ill with the same disease.

ENFORCING THE BUILDING LAWS IN PHILADELPHIA. — On the 25th ult., Capt. Hutchinson, superintendent of the West Jersey ferry, Philadelphia, received a notice from the building inspector, requiring him to demolish the fine new ferry-houses the company are erecting at the foot of Market Street, Philadelphia. It is claimed that in some respects they are in violation of law. The company will test the matter, as it will be a heavy loss to tear down and rebuild the structure, now far advanced. It was proposed to expend $125,000 in this improvement.

UNSAFE BUILDINGS. — A row of unfinished brick buildings on Norris Street and Trenton Avenue, Philadelphia, which had become dangerous, was pulled down on the 22d ult., under the orders of Building Inspector Bowers.

Public Buildings. — The construction of the public buildings at Austin, Tex., and Harrisburg, will be proceeded with, all questions as to the title of the lands upon which the buildings are to be erected having been satisfactorily settled.

The Bangor Custom House. — The westerly wall of the Bangor Custom House foundation has been for a long time gradually giving way. When originally built, a rocky bottom was not reached, so that it was simply set on a gravel bed. The water has been constantly at work, washing the bed of the stream deeper and deeper, till now it is nearly a foot below the bottom of the wall; and the water, washing the dirt in many places from under the wall, has caused the fall of several large granite rocks. Supervising Architect Lynch has set men to work, and the wall will be repaired; but it is no small undertaking. The north-east wall is bulging out, and will also before long be a source of trouble. This cannot, however, be corrected without building that part entirely over, and nothing will be done at present in regard to it.

The Losses sustained at the Patent Office Fire. — We give a carefully compiled statement of the models and records lost, and such as were saved, at the great Patent Office fire, on the 24th ult., reported by Louis Bagger and Co., Solicitors of Patents, Washington, D.C. In the North Hall, the models of the following inventions were entirely destroyed: wood-working (four classes), wood screws, wire-working, water-wheels, water distribution, tubing and wire, stabling, sheet metal, seeders and planters, saws, railways (four classes), pumps, pneumatics, ploughs, ores, needles and pins, nails, mills, metal-working (7 classes), metallurgy, horseshoes, harvesters, harrows, hardware manufacture, grinding and polishing, garden and orchard, files, dairy, casting, brakes and gins, nuts and rivets, bolts, bee-hives, baths and closets, aëration and bottling. Aggregate number of models destroyed in this hall, 57,000; valued at $885,000. In the West Hall, models of bridges, brushes and brooms, tobacco, threshing, lime and cement, stone, roofing, presses, paving, mechanical powers, car-couplings, masonry, churns, journals and bearings, engineering, hydraulics, hoisting, glass, fences, excavators, carriages and wagons, carpentry, butchering. Aggregating 36,500 models at a total value of $511,000. In the East and South Halls, besides the famous relics of the Father of our Country, and other patriots, models of the following inventions escaped destruction; sewing machines, fire-arms, looms, carding machines, trunks, tanning, surgery, sugar, stills, signals, preserving food, plating, paint, optics, fats and glue, oils, measuring instruments, manures, leather, ice, hose and belting, horology, harness, gunpowder, gas, fuel, electricity, drafting, dental, cutlery, coffins, clay, clasps and buckles, chemical miscellaneous, caoutchouc, boots and shoes, bleaching and dyeing, beer and wine, artificial limbs, felting and hats, fine arts, fishing, furniture, games and toys, governors, jewelry, kitchen utensils, knitting and netting, lamps and gas-fitting, laundry, locks and latches, music, ordnance, paper-making, paper manufactures, photography, printing, projectiles, safes, ships (two classes), silk, spinning, stationery, steam, stoves and furnaces, toilet, umbrellas and fans, valves, weaving, educational, dryers and kilns, crinoline and corsets, cordage, cloth, builders' hardware, book-binding, boats, beds and apparel. The first patent was issued to Samuel Hopkins, on July 14, 1790, "for making pot and pearl ashes." Up to 1836, 46 years, 10,301 patents were issued, and to date over 195,000. The annual number of patents granted is about 14,000. The annual receipts are about $800,000, and expenditures $660,000.

Memorial Windows at the Boston Cathedral. — There have been recently placed in the Cathedral of the Holy Cross four memorial windows. One represents the scene after the resurrection, when the doubting St. Thomas placed his finger in the wound in our Saviour's side; another represents St. Vincent de Paul bearing an infant in his arms; the third is a representation of Michael the Archangel; and the fourth represents St. Patrick, and is presented by the widow of Patrick Treanor, the builder of the cathedral. There are now but four windows in the church to be supplied with stained glass.

A Landmark. — The centre of the United States is marked by a column of masonry in the State of Kansas.

Gasometer. — What is probably the largest single-lift gasometer in the world — that built by the Boston Gas-Light Company at the corner of Island and Girard Streets — has not been used since its completion a year and half ago. It has a capacity of 1,250,000 cubic feet.

Pre-historic Man. — Indications of a pre-historic people, which are plentiful in South-western Colorado, have lately been discovered in Western Nevada. Ancient pottery and undecipherable writings on the rocks are the most common tokens. At one place, engraved upon a rock, is the nude figure of a man holding in his right hand a shrub, the outlines of which show considerable artistic skill.

Monument. — The James Lick monument is being made in Montreal.

Cleopatra's Needle. — On the 21st ult. the Egyptian obelisk left Alexandria in tow of the steamer "Olga."

The London National Opera House. — It is not unlikely that the completion of the opera house on the Victoria Embankment may be abandoned, and a hotel built upon the same foundation.

Glass-House Chimneys. — A coroner's investigation into the cause of the fall of a glass-house chimney at Warrington, Eng., seems to establish the fact that it is dangerous for such chimneys to be allowed to stand for many years. The stack in question had been built for twenty-one years, and its fall was caused by allowing it to cool down during wet weather.

New Books. — Messrs. Williams and Norgate will publish in November, "The Geometry and Optics of Ancient Architecture, illustrated by examples from Thebes, Athens, and Rome," by John Pennethorne. Prof. Michaelis of Strasbourg is preparing a work on the existing Greek sculptures in Asia Minor. It will include sculptures from the Mausoleum at Halicarnassus, the Temple of Athene Polias at Priene, and the Temple of Artemis at Ephesus.

Commemorative Medals. — It has for some years been the custom of the Municipal Government of Paris to commemorate the completion of important public buildings by striking medals in their honor. The last two are in honor of the Church of Saint-Pierre de Montrouge, and of the new Palais de Justice. The order for a medal in honor of the new Hôtel Dieu has just been issued.

Clay Statuary. — Thorwaldsen's clay group of St. John, which has for some time occupied a place above the entrance of the Frue Church at Copenhagen, has been copied in marble by several of the best Danish sculptors, as it has been decided to replace the clay figures by a group of a more lasting material.

Imperial Theatre at Vienna. — The substructure of the Imperial Theatre of Vienna is completed. The massive foundation walls rise above the street level, and the stagings are erected. The stone used for the plinth and socle is from Wöllersdorf, and is one of the most expensive building materials in Germany: a remarkably beautiful and firm nulliporous limestone. Between two hundred and three hundred cubic feet of it are used daily by the hundred stone-cutters at present employed.

Subterranean Telegraph Wires. — The German government is laying down subterranean telegraph wires as rapidly as possible. A line has been already opened between Berlin and Mayence, and it is now intended to join Frankfort and Strasbourg in a similar manner. The cost of these wires is eight to ten times greater than that of the ordinary above-ground telegraphs.

An Australian Cathedral. — A new Anglican cathedral is to be erected in Melbourne. A site has been chosen, and $65,000 subscribed.

The Kremlin at Moscow. — The Kremlin is an elevated triangular piece of ground in the centre of the city, enclosed by a wall 7,280 feet long, and entered by five gates. Originally the Kremlin was the entire city. Collected in it are several of the prominent cathedrals, the tower of Ivan the Great, the palace of the Emperor, the "Treasury" of jewels and venerated historical objects, the arsenal, one nunnery, one monastery, and a host of bells, among others the largest one in the world. In the Cathedral of the Assumption, a building overloaded with the most curious decorations, all the Russian emperors are crowned. St. Peter, the first Metropolitan or Bishop of Moscow, lies in this church. The "Tsar Kolokol," or the "King of Bells," formerly hung in the Tower of Ivan the Great, but during a fire in 1737 it fell to the ground and broke out a piece seven feet high. This great bell, reputed to be the largest in the world, measures 68 feet in circumference, 25 feet in height, and weighs 440,000 pounds.

Pressed Bricks from Blast Furnace Slag. — We are informed by the *Wurt. Gwbtt.* that pressed bricks have been made from blast furnace slag by Eng. F. Dopfer. To the powdered slag 42 per cent silicic acid, 37 per cent gypsum, 10 per cent clay, 5 per cent oxide of iron, 3 per cent magnesium, 1½ per cent sulphur, and various other materials mixed with lime are added. The mixture is given the common brick form in a steam press, and after drying in the air for three months the bricks are ready for use. The daily production of the presses is about 8,000 bricks. The cost at Wasseralfingen is 32 marks per hundred. — *Industrie Zeit.*

Relics of the Bushmen. — Mr. E. W. Stow of the Royal Geographical Society has accumulated many valuable relics of the Bushmen race in South Africa, and describes some of them in a letter to The *Athenæum*. The bulk of the collection is of paintings found in caves: they principally represent dances, and scenes of the chase, and are variously illustrative of the customs of the Bushmen. A part of the collection consists of sculptures, one stone having been laboriously used to cut another. The outlines of some of the carved figures are said to be excellent. Among the animals represented is "an unknown pachyderm with a head which seems to recall that of the dinotherium."

The King's Palace at Babylon. — The palace of the kings of Babylon is still so called by the natives under the name of the Ksar. It is a vast mass, seven hundred feet each way. The walls are eight feet thick, one within another, and are strengthened with buttresses.

An Indian Palace. — The Maharajah of Gwalior is now surrounding with a garden, which bids fair to become one of the wonders of the world, his palace erected at a cost of $1,250,000, of which the Prince of Wales was the first occupant. It will contain ten garden houses, each illustrating a variety of Hindoo architecture, and a winter palace made of glass imported from Vienna. Water will be brought from artificial lakes over channels so constructed as to give that murmur which was prescribed to afford rest to Mæcenas in his villa near Rome. The garden will be kept perennially green by irrigation. The expense of all this will be easily borne by this enormously wealthy prince.

Babylonian Ruins. — The ruins of an ancient Babylonian city have been lately discovered by M. de Sarzec, the French consul at Bosrah. In the course of his excavations he found several slabs and bronze figures. The ruins are not far from the River Hai.